CLAIMS

1.   An electromagnetic survey method for surveying an area that is thought or is known to contain a subterranean hydrocarbon reservoir, comprising:

        transmitting a source electromagnetic signal from a source location;

        detecting a detector signal at a detector location in response thereto; and

        obtaining survey data indicative of phase difference between first and second components of the detector signal resolved along first and second directions respectively.

2.   The survey method of claim 1, wherein the first and second components are radial and azimuthal.

3.   The survey method of claim 1, wherein the first and second components are vertical and azimuthal.

4.   The survey method of claim 1, wherein the first and second components are vertical and radial.

5.   The survey method of claim 1, further comprising obtaining survey data indicative of phase of a third component of the detector signal resolved along a third direction orthogonal to the first and second directions.

6.   The survey method of claim 5, wherein the first and second and third components are vertical, radial and azimuthal.

7.   The survey method of any one of the preceding claims, wherein the first and second directions are orthogonal.

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8.   The survey method of any one of claims 1 to 7, wherein the source electromagnetic signal is broadcast from an antenna mounted on a submersible vehicle which is towed over the survey area to move the source location.

5   9.   The survey method of any one of claims 1 to 7, wherein the source location is fixed.

10.   The survey method of any one of the preceding claims, wherein the source electromagnetic signal is emitted at different frequencies to obtain survey data at a
10   plurality of different frequencies.

11.   The survey method of any one of the preceding claims, wherein the source electromagnetic signal is emitted at a frequency of between 0.01 Hz and 10 Hz.

15   12.   A method of analysing results from an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:
        providing survey data indicative of phase difference between first and second components of a detector signal resolved along first and second directions respectively.
20   . extracting the phase differences from the survey data; and
        determining a metric from the phase differences that is predictive of the presence or absence of hydrocarbon.

13.   The analysis method of claim 12, wherein the first and second components are
25   radial and azimuthal.

14.   The analysis method of claim 12, wherein the first and second components are vertical and azimuthal.

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15.   The analysis method of claim 12, wherein the first and second components are vertical and radial.

16.   The analysis method of claim 12, further comprising obtaining survey data
5   indicative of phase of a third component of the detector signal resolved along a third direction orthogonal to the first and second directions.

17.   The analysis method of claim 16, wherein the first and second and third components are vertical, radial and azimuthal.
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18.   The analysis method of any one of claims 12 to 17, wherein the first and second directions are orthogonal.

19.   The analysis method of claim 18, wherein the phase differences are extracted
15   by rotationally transforming the survey data from an instrument frame to a source frame.

20.   A computer program product bearing machine readable instructions for implementing the method of any one of claims 12 to 19.
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21.   A method of planning an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:
       creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a
25   body of water above the seafloor;
       setting values for depth below the seafloor of the postulated hydrocarbon reservoir and resistivity structure of the rock formation; and
       performing a simulation of an electromagnetic survey in the model to obtain from the model phase differences between first and second components of a detector
30   signal resolved along first and second directions respectively.

22.   The planning method of claim 21, wherein the first and second components are two of radial, vertical and azimuthal.

23.   The planning method of claim 21 or 22, further comprising:

    repeating the simulation for a number of distances between a source and a detector and frequencies in order to select optimum surveying conditions in terms of source-to-detector distance for probing the hydrocarbon reservoir.

24.   A computer program product bearing machine readable instructions for implementing the planning method of claim 21, 22 or 23.